# Triton SoDAR Technology and the Promise for Wind Forecasting

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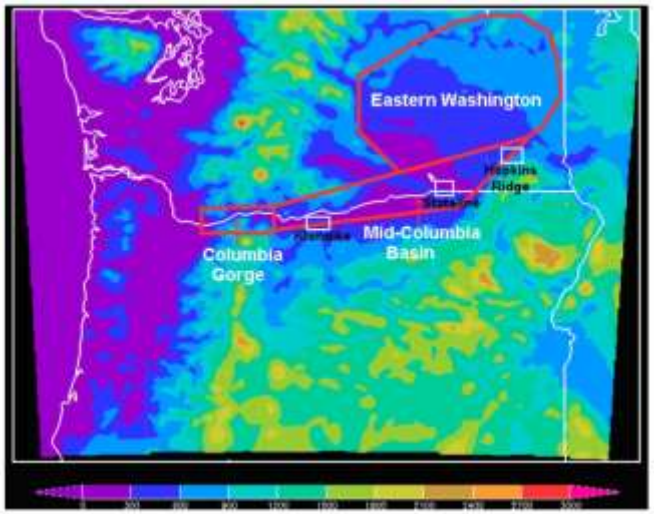
March 30, 2012

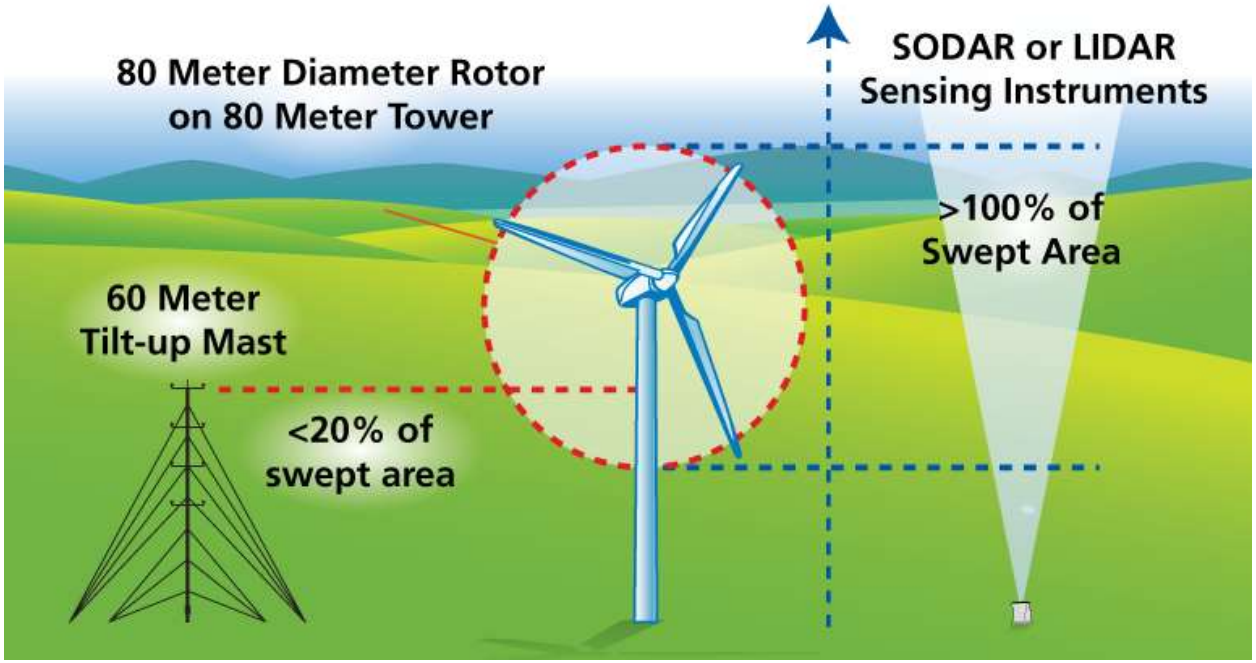
# Assumptions

- Deployment of more sensors will reduce forecasting error
- Employing a diversity of sensor technologies will reduce outages and increase robustness
- Data delivery in real time
- Autonomous operation with self diagnostics
- Remote monitoring and troubleshooting



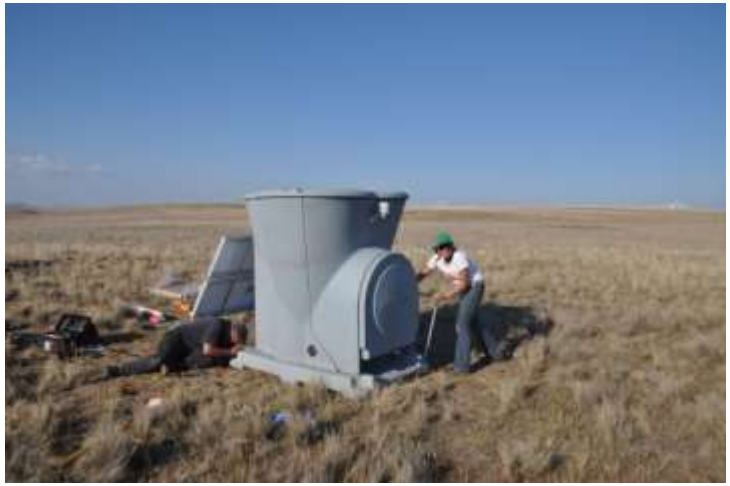
# About Second Wind

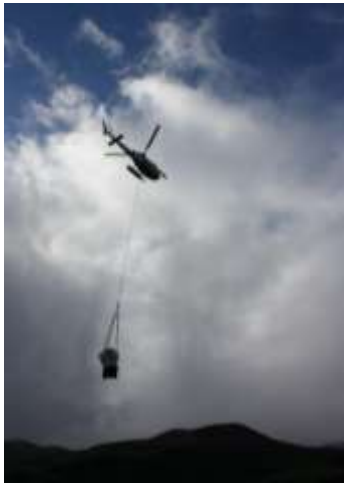
- More than 30 years of supporting the instrumentation needs of the wind industry
- Roots in turbine control, monitoring, and tower-based measurement technology
- Adapting to the increasing size of commercial wind turbines changed our focus to remote sensing in 2006



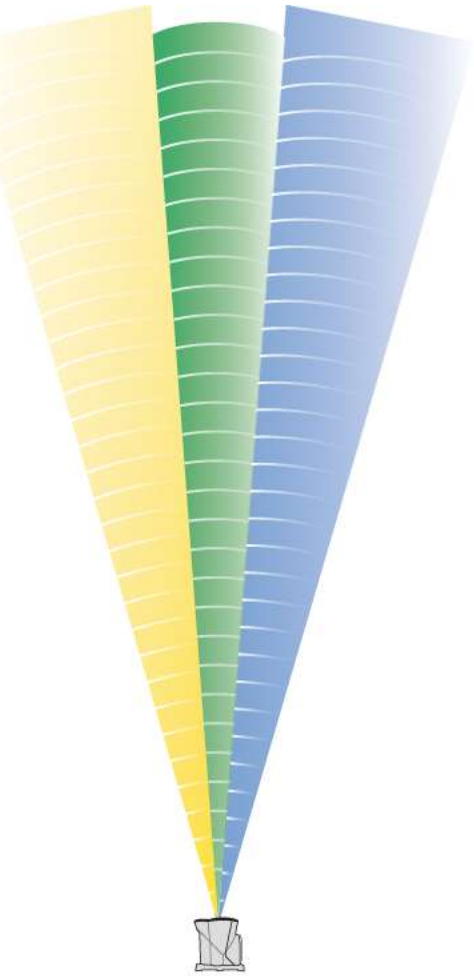
# Triton Sonic Wind Profiler

- Redesigned SoDAR for massive commercial use
- Modernized the technology to use the latest digital audio and signal processing techniques
- Ruggedized for remote deployment
- Reduced power consumption to 7 Watts from solar/battery
- Customized communications protocols to provide real-time data transmission via inexpensive satellite/CDMA modem

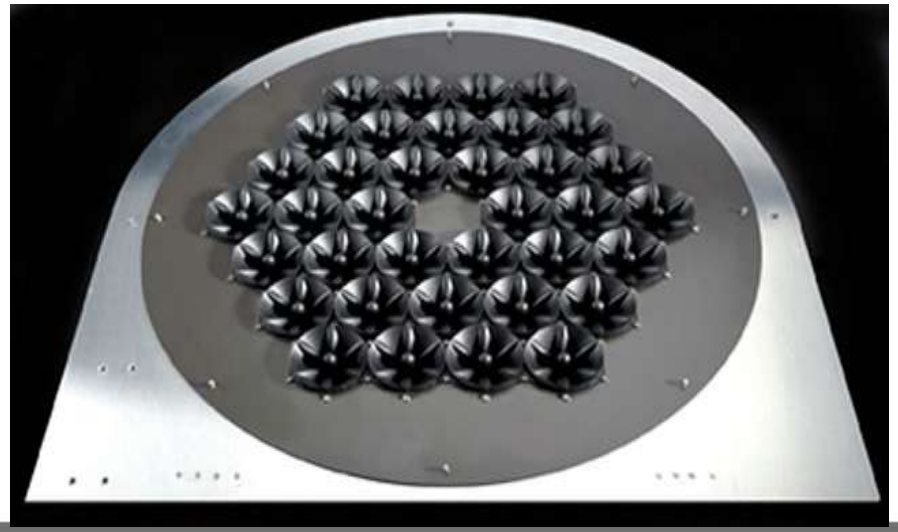




# Triton Sonic Wind Profiler



- Phased array SoDAR with 36 elements
- Focuses sound on one of three beams
- Analyzes Doppler shifted echoes over ten-minute interval
- Computes 3D wind speeds at heights from 30 to 200 meters above the ground
- Corrects for inclination and orientation
- Data tagged with GPS time and location

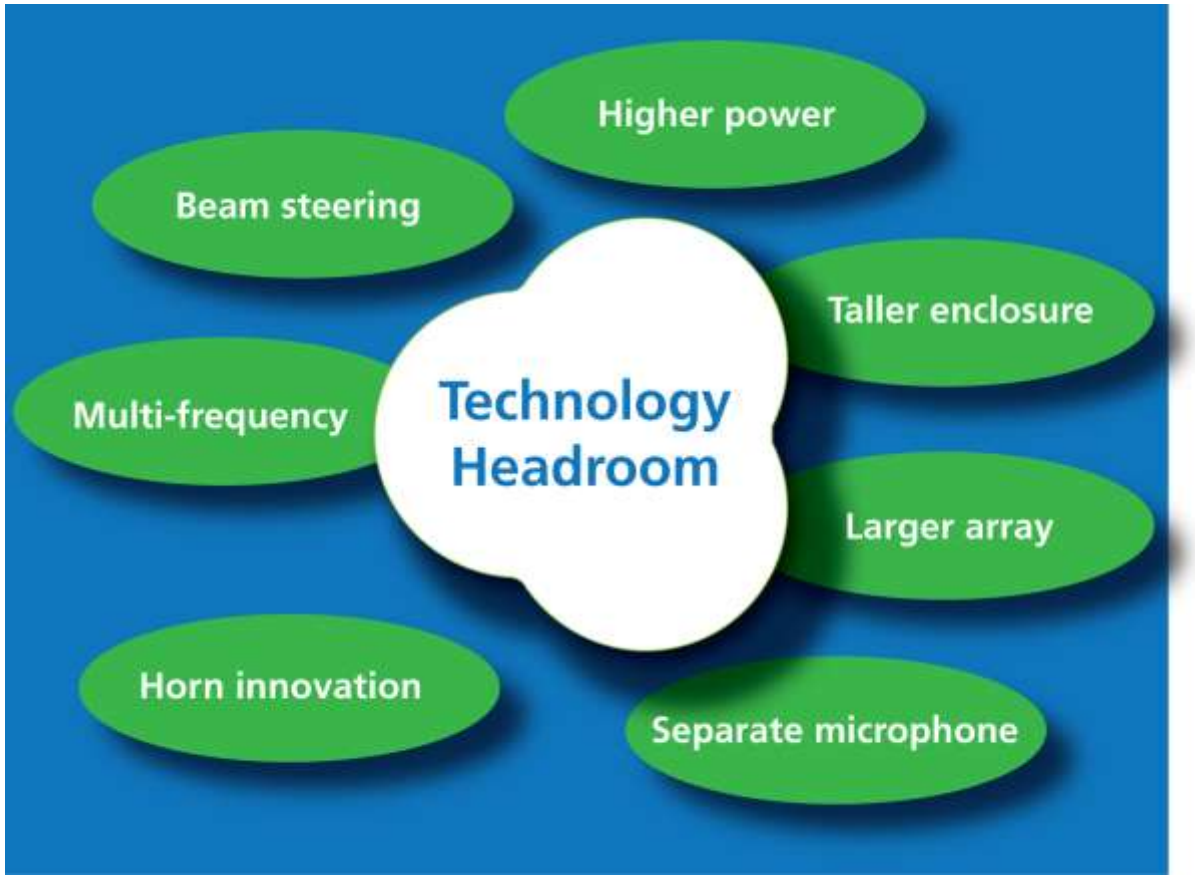


# Commercial Product

- Commercialized in 2008
- 9 patented technologies, 43 others patent pending
- More than 400 commercial units in the field
- 4.6 Million hours of accumulated data
- Sending data via the Internet every 10 minutes
- Centrally monitored – performance analyzed daily
- World leader in remote sensing for the wind industry

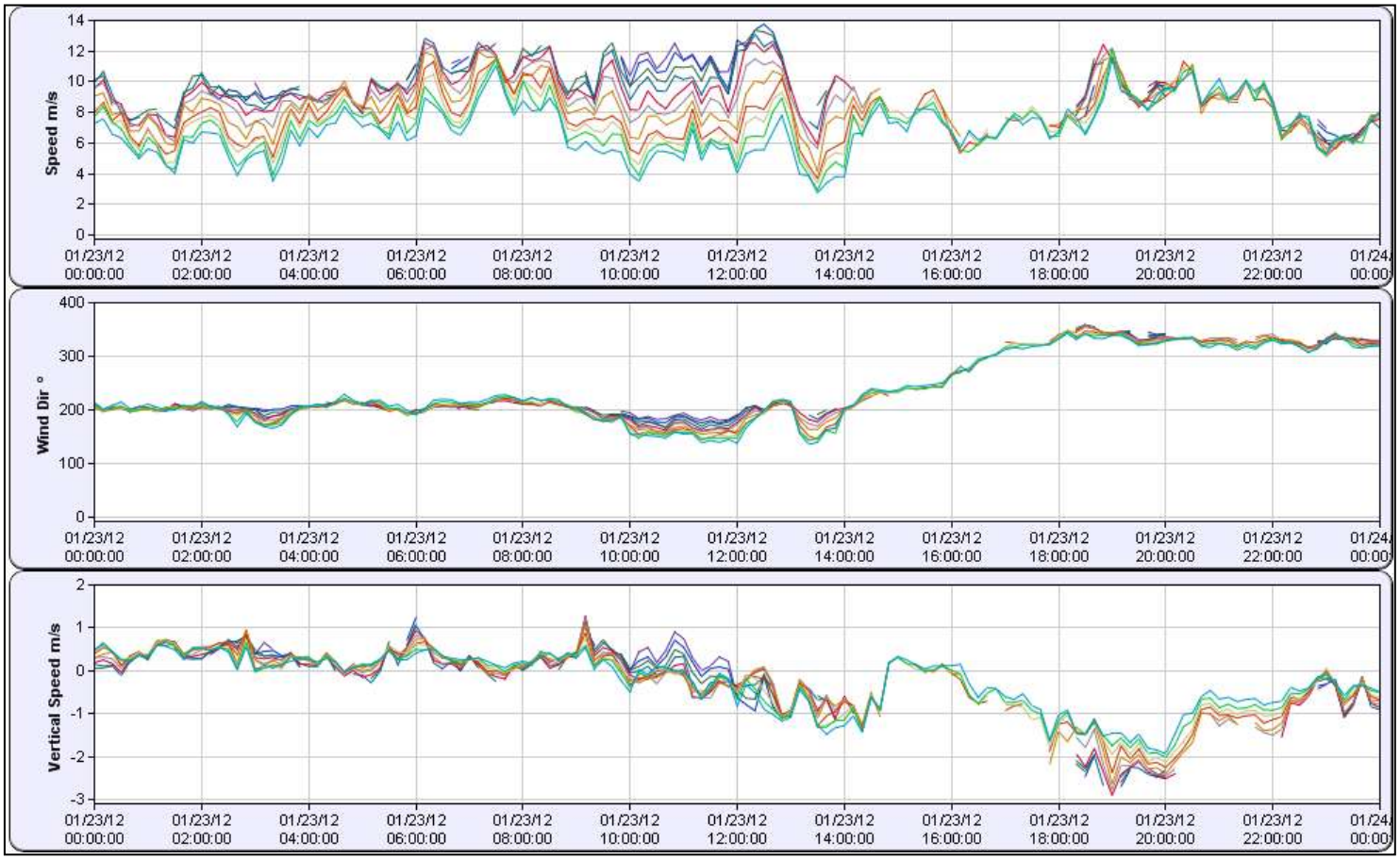
# Promise for the future

- Tremendous technological headroom for SoDAR
- Very practical technology – will become more so
- Revisit trade-offs and design for new applications



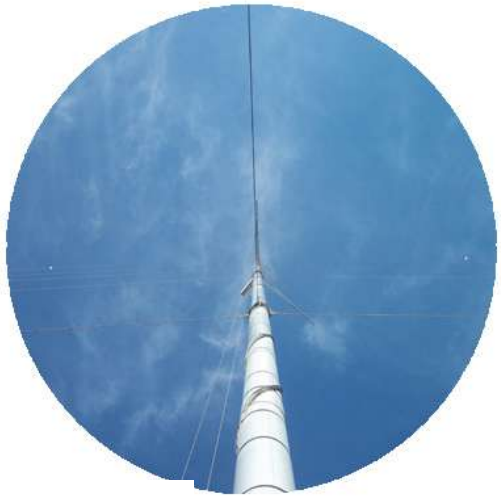
# Compared to older tower-based systems

- Rich set of wind data from more and higher heights
- Detect flow phenomenon – low level jet, shear, veer
- Real-time data from many sites – follow weather systems



# Suite of technologies

- Many sensing technologies have unique advantages
- Why not use them all?

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